Description

The DL5465ES2 is a low capacitance TVS array, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The DL5465ES2 has a low capacitance with a typical value at 0.9pF, and complies with the IEC61000-4-2 (ESD) standard with ±30kV air and ±30kV contact discharge. It is assembled into a 6-pin lead-free SOT23-6 package. The low capacitance array make it ideal for four high speed data and transmission line. This device is optimized for ESD protection of portable electronics.

Mechanical Characteristics

- Package: SOT23-6
- Lead Finish: Matte Tin
- UL Flammability Classification Rating 94V-0
- Case Material: “Green” Molding Compound
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

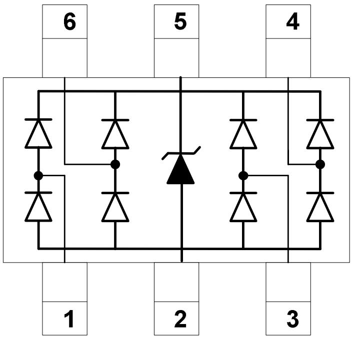
Features

- Ultra low capacitance: 0.9pF typical (I/O to I/O)
- Ultra low leakage: nA level
- Low operating voltage: 5V
- Low clamping voltage
- Up to 4 data lines and one power line protects
- Complies with following standards:
  - – IEC 61000-4-2 (ESD) immunity test
    - Air discharge: ±30kV
    - Contact discharge: ±30kV
  - – IEC61000-4-4 (EFT) 40A (5/50ns)
  - – IEC61000-4-5 (Lightning) : 15A(8/20μs)
- ROHS Compliant

Applications

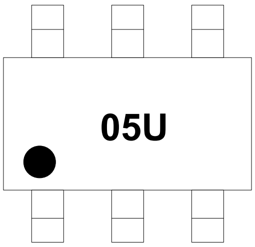
- USB 2.0
- Video Graphics Cards
- Digital video interface(DVI)
- Monitor and Flat Panel Displays
- Notebooks
- IEEE 1394 firewire ports
- 10/100 Ethernet

Dimensions and Pin Configuration



Circuit and Pin Schematic

Marking Information



05U = Device Marking
Code Dot denotes Pin1

Ordering Information

Part Number	Marking	Packaging	Reel Size
DL5465ES2	05U	3000/Tape & Reel	7 inch

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol	Rating	Unit
Any IO Pin			
Peak pulse power (t_p = 8/20μs)	P_{pk}	240	W
Peak pulse current (t_p = 8/20μs)	I_{PP}	15	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	±30	kV
ESD according to IEC61000-4-2 contact discharge		±30	
Junction temperature	T_J	125	°C
Operation temperature	T_{OP}	-40 to 85	°C
Storage temperature	T_{STG}	-55 to 150	°C
Lead temperature	T_L	260	°C
VDD Pin			
Peak pulse power (t_p = 8/20μs)	P_{pk}	900	W
Peak pulse current (t_p = 8/20μs)	I_{PP}	50	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	±30	kV
ESD according to IEC61000-4-2 contact discharge		±30	
Junction temperature	T_J	125	°C
Operation temperature	T_{OP}	-40 to 85	°C
Storage temperature	T_{STG}	-55 to 150	°C
Lead temperature	T_L	260	°C

Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Any IO Pin						
Reverse stand-off voltage	V_{RWM}				5.0	V
Reverse leakage current	I_R	V_{RWM} = 5V		<10	100	nA
Reverse breakdown voltage	V_{BR}	I_{BR} = 1mA	7.0	8.5	10.0	V
Forward voltage	V_F	I_F = 10mA	0.6	0.9	1.2	V
Clamping voltage [1]	V_{CL}	I_{PP} = 16A, t_p = 100ns		13		V
Dynamic resistance [1]	R_{DYN}	t_p = 100ns		0.2		Ω
Clamping voltage [2]	V_{CL}	V_{ESD} = 8kV		14		V
Clamping voltage [3]	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			12	V
		I_{PP} = 15A, t_p = 8/20μs			16	V
Junction capacitance	$C_{I/O\text{ - }GND}$	V_R = 0V, f = 1MHz, VDD = floated, any I/O to GND		1.8	3.0	pF
	$C_{I/O\text{ - }I/O}$	V_R = 0V, f = 1MHz, any I/O to I/O		0.9	1.8	pF
VDD Pin						
Reverse stand-off voltage	V_{RWM}				5	V
Reverse leakage current	I_R	V_{RWM} = 5V		<10	100	nA
Reverse breakdown voltage	V_{BR}	I_{BR} = 1mA	6.5	8.0	9.5	V
Forward voltage	V_F	I_F = 10mA	0.5	0.8	1.1	V
Clamping voltage [3]	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			10	V
		I_{PP} = 50A, t_p = 8/20μs			18	V
Junction capacitance	C_J	V_R = 0V, f = 1MHz, VDD to GND		300	450	pF

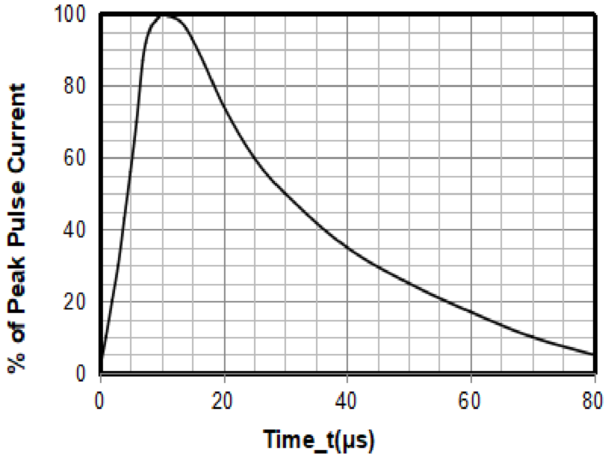
Notes:

1) *TLP parameter: Z_0 = 50Ω, t_p = 100ns, t_r = 2ns, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.*

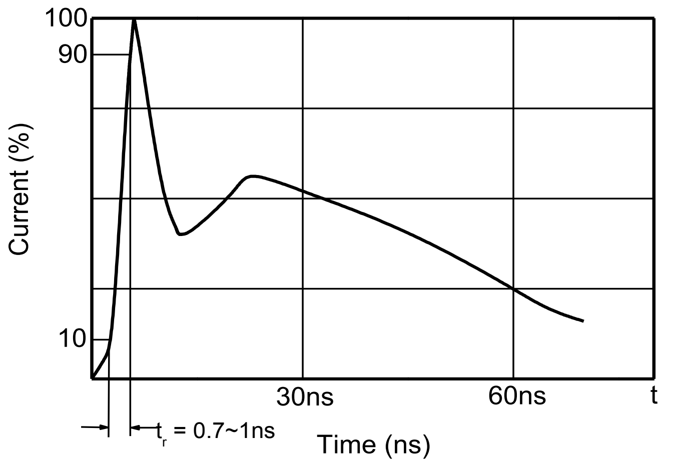
2) *Contact discharge mode, according to IEC61000-4-2.*

3) *Non-repetitive current pulse, according to IEC61000-4-5.*

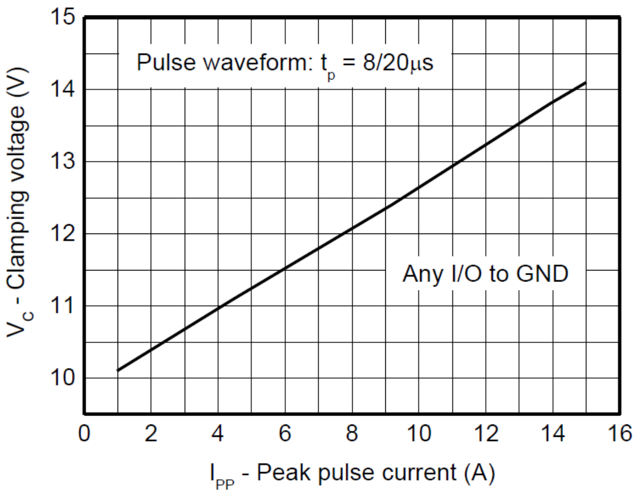
Typical Performance Characteristics (T_A=25℃ unless otherwise Specified)



8 X 20μs Pulse Waveform

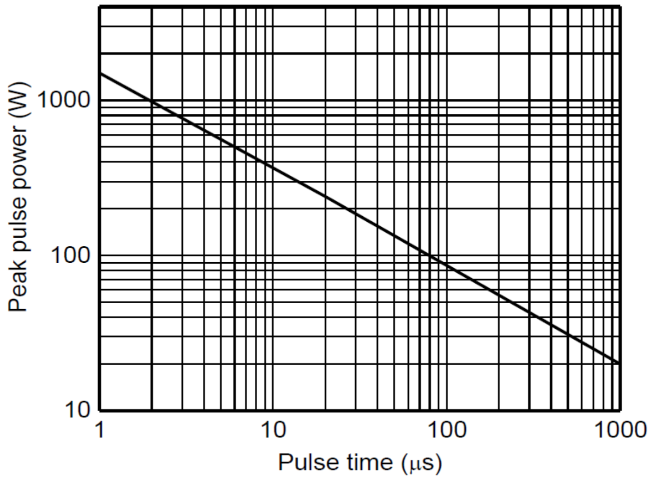


Contact discharge current waveform per IEC61000-4-2



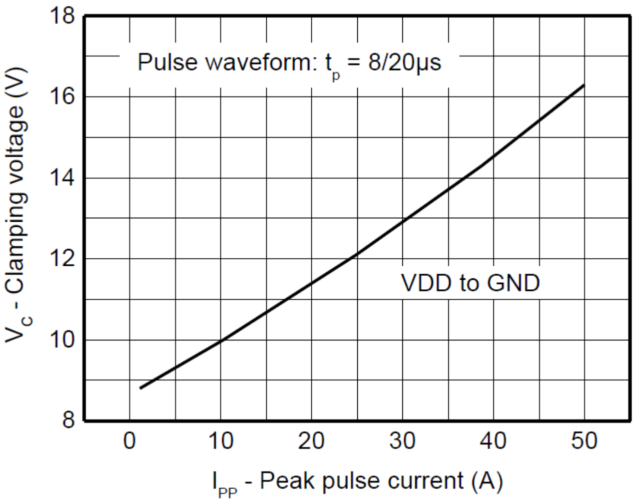
Clamping voltage vs. Peak pulse current

(Any IO Pin)



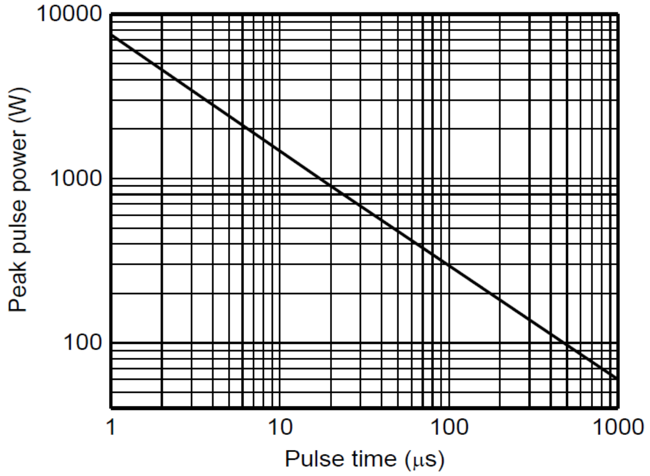
Non-repetitive peak pulse power vs. Pulse time

(Any IO Pin)



Clamping voltage vs. Peak pulse current

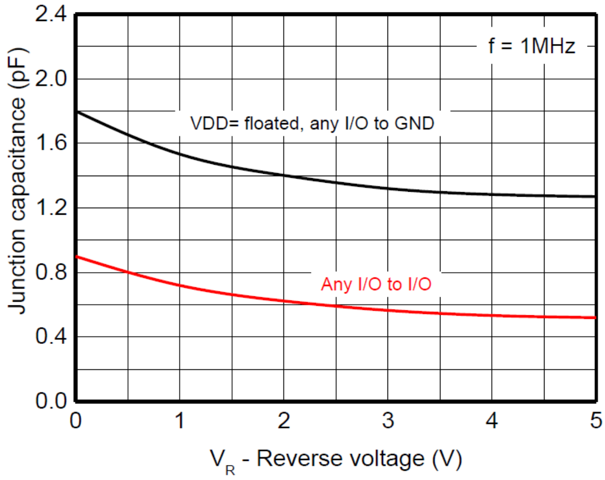
(VDD Pin)



Non-repetitive peak pulse power vs. Pulse time

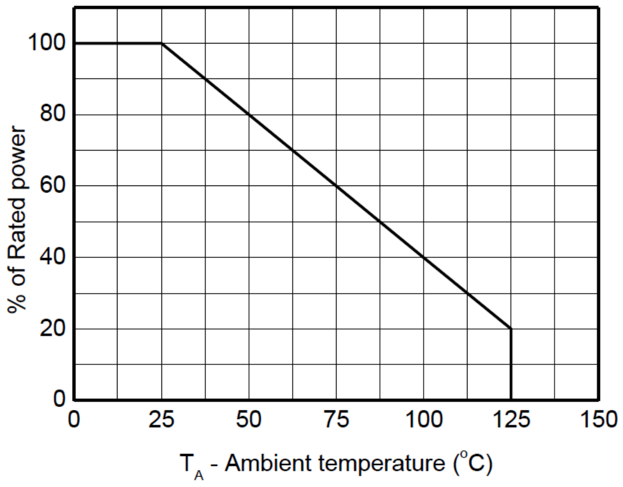
(VDD Pin)

Typical Performance Characteristics (T_A=25℃ unless otherwise Specified)

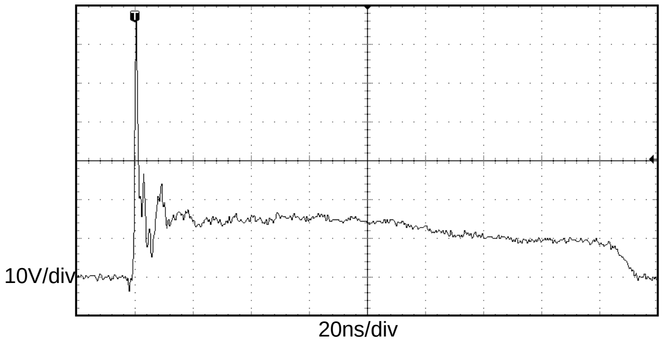


Capacitance vs. Reverse voltage

(Any IO Pin)



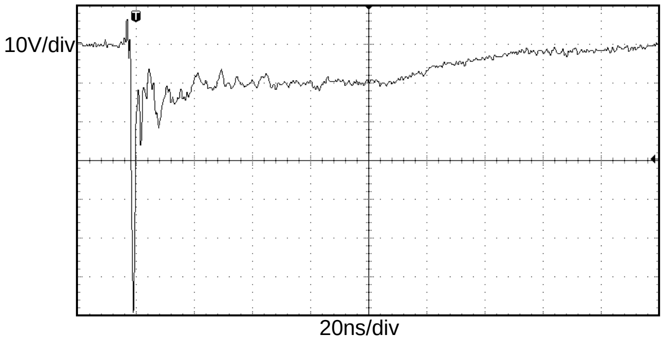
Power derating vs. Ambient temperature



ESD clamping

(+8kV contact discharge per IEC61000-4-2)

(Any IO Pin)

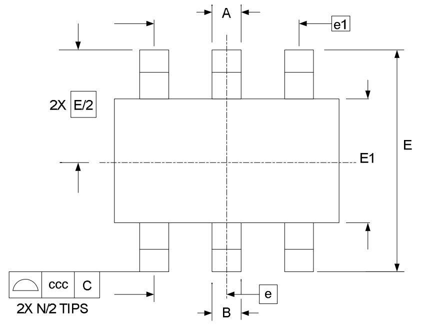


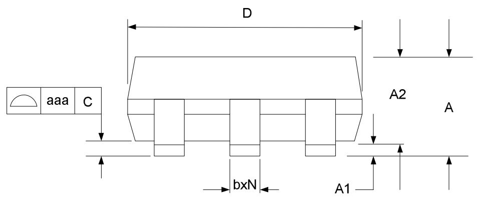
ESD clamping

(-8kV contact discharge per IEC61000-4-2)

(Any IO Pin)

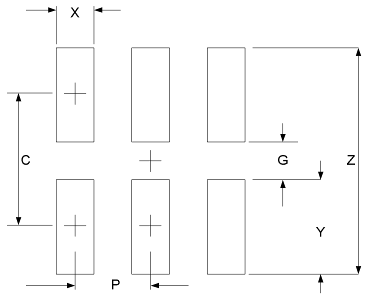
SOT23-6 Package Outline Drawing





SYM	DIMENSIONS					
	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90		1.45	0.035		0.057
A1	0.00		0.15	0.000		0.006
A2	0.90	1.15	1.30	0.035	0.045	0.051
b	0.25		0.50	0.010		0.020
c	0.08		0.22	0.003		0.009
D	2.80	2.90	3.10	0.110	0.114	0.122
E1	1.50	1.60	1.75	0.060	0.063	0.069
E	2.80 BSC			0.110 BSC		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
N	6			6		
aaa	0.10			0.004		
ccc	0.20			0.008		

Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
C	2.50	0.098
G	1.40	0.055
P	0.95	0.037
X	0.60	0.024
Y	1.10	0.043
Z	3.60	0.141

Contact Information

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